to say, whether there is either physical or psychic sex tension, unrelieved and unexpressed.

(c) Insight and judgment:
Has the patient any degree of correct appreciation of his difficulties? Is he open to argument or blindly prejudiced? Aware of the nature of his trouble?
What are the present and future plans? Are they absurd or reasonable? Are they consistent with past experience and capacities, and present condition.

Orientation and Memory:

(a) Orientation: Appreciation of present and most recent events; present date and location; nature of the interview; note any tendency to fabrication.

(b) Memory for recent events: Deal with those occurring within the past few days or past year, for instance, current news, account of activities during the past twenty-four hours or longer.

(c) Memory for remote affairs: This should include the grasp on general and school knowledge and personal data, for instance, dates of marriage, births of relatives and other domestic events.

(d) Special tests for the retentive faculties: (Be careful to distinguish between disorder of the attention and failure of retention).
(1) Recalling of names (after one minute and day later).
(2) Repetition of numbers (up to those of seven digits).
(3) Reproduction of short story or news items told or read. (Immediately and twenty-four hours later.)

Special Intelligence Tests:*

These are to be used when feeble-mindedness or organic brain disease is suspected.

(a) The Binet-Simon Scale g. v.

(b) Healy's modification of Binet-Simon Scale g. v.
(Psychological Monograph No. 54. Princeton, March, 1911.

(c) Ziehen's tests (of value in all ages above six years for determining special defects, for instance, in retention, abstraction, generalization, definition, differentiation, exemplification and combinative activity. g. v. (Berlin, Karger, 1909). Terman's "Measurement of Intelligence" (Stanford Revision of Binet-Simon test).

Diagnostic Summary:

This should include the physical and neurological findings first of all. Then in order of development mention the striking facts relative to symptoms of mental disorder as shown by the anamnesis, their duration and progression. Then note the positive mental findings under the various headings of the mental examination, and in the order given.

* See also: Franz' "Handbook of Mental Examination Methods." Jour. Nervous and Mental Disease, Mon. No. 10, 1912.
See also: Hoch & Amsdan, "A Guide to the Descriptive Study of Personality," in Review of Neurology and Psychiatry, Nov., 1913.

POST-TRAUMATIC NEUROSES: THEIR MECHANISM*

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Following physical trauma, patients may present mental and nervous symptoms and signs, which in the present stage of our knowledge of neurological localization, cannot be definitely related to any specific portion of the nervous system. In explanation of the basic mechanism of these disturbances, three schools of thought have developed. The first holds that there is a definite organic basis for the phenomena; the second that the disease pictures rest on a psychogenic and non-organic basis; and the third school is made up of investigators who have varying opinions including organic and psychogenic features.

Since the time of "railway spine," medical men have tended to place themselves either in the organic or psychogenic school rather than taking the less final, less extreme position, which admits of the operation of both sets of factors.

With the advent of war, its shell explosions, burials and other physical traumata; and with the coming of compensation for industrial injuries; the two diametrically opposed schools have found expression in different forms of treatment for the neuroses in the military, and in the handling of the so-called post-traumatic neuroses following industrial accidents. When identical symptoms have meant to one observer a psychogenic condition and to another an organic syndrome, and when neither observer will admit the position of the other as tenable, then military efficiency must have suffered by the therapy of one school or the other. Similarly if Dr. A reports that a given set of symptoms following a head injury received in industry, rests on a psychogenic basis and should be terminated at once with cash settlement; and Dr. B finds that an identical case rests on an organic basis and calls for prolonged treatment and compensation; and if a Commission carries out the respective recommendations of Drs. A and B, then a grave error has been made in one case or the other.

There should be a more clear definition of traumatic neuroses. It is because of the lack of such definition that there is marked difference of opinion as to the frequency of these conditions both in war and peace. While it would be more scientific to consider these neuroses in a restricted sense, nevertheless it is more practical to consider these conditions in an inclusive sense, the sense of more common usage. However one most not make the extreme use of the term which is inaccurate, unscientific and useless and which would include even such gross organic conditions as psychoses, cerebrospinal syphilis and other conditions, which have not been recognized, and the symptoms of which have simulated neurosis pictures. It would seem that the average medical man would consider the following to define a post-traumatic neurosis: The term, post-traumatic neurosis, traumatic neurosis or traumatized neurosis, is applied to conditions manifested by certain psychasthenic, neurasthenic, hypochondriacal and hysteric phenomena, either alone, or in any combination—which phenomena appear to be the results of physical trauma—and accompanying which one is unable to demonstrate the clinical signs of known organic neurological disease. It is with this set of conditions that this communication concerns itself.

Given then, such a picture, what is its basic mechanism? The first step in any case should be an exhaustive investigation for organic findings. The laboratory and the specialties should reinforce

* Read before the Fiftieth Annual Meeting of the Medical Society of the State of California, Coronado, May, 1921.

complete routine examinations. More commonly than might be supposed, slight signs of psychoses, cerebrospinal pathologies of various sorts, and other neurological conditions escape notice, and a case is wrongly termed a traumatic neurosis, because the symptoms commonly assigned to the latter are in the ascendency.

THE PSYCHOGENIC MECHANISM

No signs of organic localization having been found, let the psychological phase of the case be considered. In the war studies were made of this aspect of individual cases, and of the whole subject of neuroses as well. The majority of observers seem, as a result of these studies to incline to the view that the neuroses are psychogenic in origin. It was demonstrated how in the wake of battle, and in the presence of exposure, exhaustion and the rest, instinctive processes related to self-preservation were set in motion, and how were developed the sub-conscious strata on which various neurotic pictures developed to the end that the soldier found himself removed from the field of battle. It was shown how responsibilities, and ethical standards and various psychological phenomena determined that officers developed neuroses more often than their men; that prisoners exposed to the same shell fire as troops, developed neuroses with much less incidence; that great injuries to the nervous system were not accompanied by these pictures; that the neurotic conditions attributed by some to the physical traumata of war, were in fact no different in appearance nor in mechanism than those of non-traumatic nature, seen in peace; how the preponderating number of such cases could be cured very quickly by psychotherapy. Further it was pointed out that many men were exposed equally to shell concussion and that only certain of them developed the symptoms; it has been reported that in a group exposed to shell fire sleeping soldiers escaped while those in the waking state became victims of neuroses. There were more cases developed in the hospitals farther from the front and nearer to the home.

Likewise the exclusively psychic nature of these cases has been advanced in civilian life by the study of similar psychological processes to those mentioned as accruing in war; the unconscious tendency to escape disagreeable situations; the ideas developing around compensation for industrial accidents and suits for damage for personal injury; these and other factors have been found a part of a basic psychological mechanism. Numerous observers report that their experiences have demonstrated that settlement on a cash basis, with closure of the case, has actually terminated the traumatic neurosis picture. (Bailey, Boon, Diller, Dercum, Dye, Morselli, Naegeli, et al.) Attention has been directed to the frequency of head injuries in football players and the infrequency of the subsequent development of traumatic neuroses in these persons. Someone has stated that following railroad wrecks, the neuroses develop in the litigation type of passengers and not in the crew.

THE ORGANIC MECHANISM

These exclusively psychogenic factors are not sufficient explanation according to the organic school. They state that definite damage to the central nervous system may follow physical trauma and that there may be no signs of external injury, nor signs of localizable organic neurological pathology. They state that cases exposed to shell concussion may develop both frank organic neurological pictures, with or without so-called neurotic pictures without localizable neu o-logical findings. Those cases which have died, and death has occurred repeatedly without evidences of external physical injury, have shown nervous system pathology. Macroscopically there have been small hemorrhages scattered throughout the central nervous system: brain substance, meninges, medulla, and spinal cord have shared in the distribution; frank hematomyelias have been found. Microscopically there has been degeneration of certain brain and cord cells; the Purkinje cells of the cerebellum have shown a disappearance of Nissl bodies and a tendency to take acid rather than basic stains; and certain cells, *e. g.,* those of the vagus-accessory group tend to show changes in a more marked degree. During the period of clinical activity these concussed cases have at times shown changes in spinal fluid, namely increased pressure, increase in albumin and lymphocytes, and presence of blood. Retinal hemorrhages have been seen with the opthalmoscope. The distance men have been blown, the rupture of the ear drum, the damage of middle and inner ear structures, which have resulted from shell explosions are mentioned to show that the transmission of so great a pressure through the spinal fluid would account for the changes seen post mortem. These evidences of the effects on the nervous system of concussion by air, would indicate far greater effects from physical trauma of solid objects both in war and peace. One observer of 74 men suffering as the result of shell concussion, reports that in the first 24 hours, 67 showed localizable organic neurological lesions; later the signs disappeared; if all the neurosis cases were given early thorough observation it would seem that similar findings would be present. Cases of organic paralyses have followed concussion and subsequently cleared up. It is well known that lightning or electric shocks may cause neurological pathology or even death and yet the pathology in certain of these cases has not been determined with any more definiteness than has that of the neuroses. Various experimental observations would support the idea that physical trauma without external signs of injury may cause organic neurological changes. Rabbits have died as the result of shell concussion and postmortem has shown hemorrhage into the spinal cord and nerve roots and rupture of blood vessels in the cortical gray matter. Foci of degeneration in the spinal cord and changes in the axis cylinders have been found. Rabbits placed in a centrifuge and spun, have shown, postmortem, small hemorrhages into the central nervous system.

THE ORGANO-PSYCHOGENIC MECHANISM

The investigtors who place themselves in a third school are interested in the possible roles of both factors. They listen with interest to the definite stands taken by the organic and psychogenic thinkers as outlined above. They hear the arguments when the members of these schools talk over their

respective viewpoints. The psychogenic school states that there has been no demonstrated pathology for commotion or concussion. They are answered by the statement of fact that the pathology of cerebral hemiplegia has not always been known; that years of research have been necessary to give today's knowledge of neurological localization; and attention is directed to the removal of great masses of symptomotology formerly though hysterical, from that class, by Babinski and others; and these data together with the organic changes found to have resulted from concussion by Mott and others, are sufficient, they state, to indicate that the definite organic basis will be demonstrated in due time. (The organic school say, consider how little is known today of neurological localization, when one thinks of the so-called "silent" brain areas and the sympathetic nervous system.)

The psychogenic school invite attention to the fact that persons of psychoneurotic disposition are more likely to develop neuroses, and that given the same concussion only certain persons, therefore, develop the neurotic pictures, *e. g.,* in shell explosion cases. The organic group denies that concussion from a given shell explosion could possibly act through the same lines of force on different individuals and further states that individuals themselves will have been in different positions at the time of the explosion, *e. g.,* prone, erect or sitting.

Babinski shows certain of the difficulties connected with these considerations when he says, "How is it possible to find the true cause of nervous symptoms, when their appearance is the same whether they are organic or functional." For such has appeared to be the case, *e. g.,* following head injury. The patient may present headache, vertigo, insomnia, irritability, memory defects, asthenia, etc., when there is gross organic pathology; when in the absence of localizing neurological signs, the psychogenic school would call the case functional; and again when in fact, no disease process whatever existed and the patient was simulating. As Cushing has said in effect, since cerebral injury can produce these symptoms, and since lack of ability to localize pathology doesn't mean there is no damage, how can it be arbitrarily stated that there is no organic basis? The organic school denies flatly that all cases presenting symptoms and signs that would lead to a diagnosis of traumatic neurosis, are amenable to psychotherapy and rapid cure: Attention is directed to the fact that even staunch members of the psychogenic group, must mention in their own writings, cases in which treatment has been necessary over long periods; statements are made that after hysterical elements have been disposed of, neurasthenic ones may persist indefinitely; while some cases may be settled with a bonus or flat sum, others require prolonged care; some patients are unable ever to return to their former occupations. Further without careful checking up it cannot be said with a finality that the "cash sum settled" industrial case has in reality lost all of his symptoms.

Those who attack the subject from the psychological angle are enabled through their questions and answers, word associations, psychogalvanic reactions, hypnotism and psychoanalysis, to develop a more basic psychological mechanism for the neuroses, than that which is immediately apparent; they are enabled to interpret the symptomotology in the light of certain conscious and subconscious phenomena. They have simplified the psychological picture; have they, however, touched the basic pathogenesis? Is there not a pathological anatomy and physiology at the basis of the demonstrated pathological psychology? Even if there were no evidence of macroscopical or microscopical pathology, is it not probable that there is biochemical or other abnormal state? No one would declare that the acute intoxication of alcohol or of morphine rested on a psychogenic basis and yet the basic pathology of these intoxications need not be more gross than that of the neuroses. Fatigue, exposure, lack of food, overexertion, infection, all of these are recognized by the psychogenic proponent as contributing factors to the development of a neurosis. These factors are known to produce metabolic, vascular, endocrine and other disturbances, and certain biochemical changes of which we will know more and more as time goes on. Crile and others have taken a further step and described microscopical and staining alterations in various organic cells as the result of the action of similar etiological factors. If a physical concussion can, without signs of external violence, produce the gross changes in the central nervous system described by Mott and others, it seems reasonable to suppose that the changes of biochemical nature would be even more likely to be present. And, on the other hand, psychological factors can disturb more than psychological equilibrium; the work of Cannon and others has shown that fear and other emotions may indeed cause pathological change. The nausea induced in man at the sight of a horrible object, or the changing of his mood from a grouch to joy by a hearty meal, gives one much to think about as regards the relations of the organic and the so-called psychological.

The consideration of traumatic neuroses naturally carries one back to fundamentals; it necessitates a consideration of the relation of mind and brain, which naturally is not within the province of this paper. It would seem that in the last analysis one's attitude concerning these neuroses would depend on the following: If one can conceive a mind as apart from brain, then he may conceive a psychogenic neurosis in absolute independence of macroscopic, microscopic or biochemical change in the nervous system. If he sees in mental processes the expression of brain processes then he must necessarily join in the research which would find a basic organic change for the neuroses. Can the psychogenic student deny that hysteria may be due to a physico-chemical change capable of prompt return to normal? One should remember with Lugaro that "The examination of the hysterical person has so far been almost exclusively limited to the psychic and nervous manifestations, which veil the true disease under a mask of symptoms; and beneath this perhaps a more definite substratum of organic alteration, than is generally imagined may

lie hidden." Much has been written of vascular disequilibrium, and of endocrine disturbances, and others as a basis of neuroses. This would seem to be a fertile field for study. It has been possible in a series of cases at the Stanford clinics to demonstrate that while through the usual psychological modes of attack, interesting and more simple psychogenic mechanisms were developed, nevertheless it was only necessary to continue examinations along other lines to find that at the basis of the psychological pathology there appeared to be a definite endocrine dysfunction, and other morbid condition.

The practical side of a communication of this sort would be a consideration of certain of the data looking towards more uniformity in medical opinion, and certain of lines of future investigation.

Experience at the Stanford Clinics would seem to indicate that had more than perfunctory examination been made in many of the supposedly psychogenic disorders, certain physical pathology would have been found. How seldom, with the reports of cases treated and "cured" by psychotherapeutic means, has there been a report of the complete physical status? When the psychoanalyst has found a disturbed sexual psychology in the conscious or less conscious realms, as the basis for certain symptoms, he may need only go a step further and find thyroid or ovarian dystrophy or some other very definite pathology as the probable cause.

Differential symptomotology should be worked out as between the frank and less frank organic conditions, the latter of which have been termed functional.

Surveys should be made of the after-histories of accident cases thought to have been settled by the "lump sum closure method."

Early complete examinations should be made in order to detect localizing organic signs which may later disappear.

Experimental work on animals should be continued as regards injuries to the nervous system following physical trauma with or without external evidences of injury.

It has been the aim of this paper to be expository of attitudes rather than argumentative for one or another school. It has been read in the hope that the discussion may indicate lines of investigation which might lead to greater understanding among physicians as to the roles of organic and psychological factors and their interrelations.

CLINICAL EXPERIENCE AS TO THE SEVERAL KINDS OF PHYSIOTHERAPY EMPLOYED IN RECONSTRUCTION WORK*

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A witty Irishman once remarked to the writer that all surgery could be described in three words —"You find a thing and you cut it or tie it. Now, medicine," he continued, "is a much more difficult subject. It takes four words to describe all medicine. You dilate, you contract, you modify nutrition." Now, without pausing to argue with our internal medicine friends, whether by means of their materia medica they can do *more* than dilate, contract and modify nutrition, we can assert with considerable certainty that this is a very fair definition of the fundamental workings of physiotherapy. By it, beyond a question of a doubt, you can dilate, you can contract, and you can modify nutrition. Or, to put it differently, you may say by physiotherapy you can stimulate, you can soothe, and you can augment metabolism.

We, as industrial surgeons, are interested in physiotherapy in its application toward improving the function of the motor apparatus. Now, function is essential to the well-being of our organs of locomotion; when for any reason they are put out of commission they suffer in all their parts—bones become demineralized, muscles atrophy, the venous and lymphatic systems become turgid, motor nerves lose in part their power of transmitting definite selective motor impulses.

But, in order to permit reparative processes to proceed, or at times because of actual damage to some factor essential to locomotion (and under this heading I would include the upper as well as the lower extremities and the supporting structures of the trunk), it happens that function has to be excluded.

Now, the purpose of physiotherapy is to maintain as nearly as possible that state of being in a disabled part which would be normally brought about by function, and later, after the immediate repair of injury, to restore lost function.

Physiotherapy, in one form or another, was employed by the ancients; witness Thermae of the Greeks, and even savages, who had not yet entered into that higher stage of social evolution which we designate barbarism, employ it; such, for example, were the massage methods of the Maories of New Zealand, and the hot sweats and contrast baths of the North American Indian. But among ourselves, while not unknown, it did not come into its own until the reconstruction problems of the war forced upon us its more general recognition. One reason for this delayed recognition lay in the fact that most of those among us who practiced it were persons too imperfectly educated in critical medicine to be able to differentiate pathological processes, or to record physical findings, had they been minded to make them—which, incidentally, they were not. Often they were honest enough, but possessed of that mystical order of mind typified in Wilde's character, who exclaimed, "I can believe anything so long as it is incredible."

Fortunately, for industrial surgery, the war sent practically the whole medical profession into the army, and concentrated the best medical thought of the age upon the problem of the reconstruction of the crippled soldier. Only then did the great value of treatment by physical means receive general recognition. And now, in the third year after the war, when no doctor's office seems complete without its therapeutic aid, one begins to wonder has not the pendulum swung back too far—are we not in danger of asking too much of physiotherapy?

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